Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SET B

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024

Semester : Semester V - 2021
Course Code : CSE3076
Course Name : Artificial Intelligence for Robotics
Program : B.Tech.

Date : 04-JAN-2024
Time : 9:30AM - 12:30 PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **5 X 2M = 10M**

1. Explain the Law of Identity with an example.
(CO1) [Knowledge]
2. Explain the importance of a "Controller" in a robot in two points.
(CO2) [Knowledge]
3. What are the types of image recognition?
(CO3) [Knowledge]
4. What is Acoustics Model?
(CO4) [Knowledge]
5. What is Artificial Neural Network?
(CO3) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **5 X 10M = 50M**

6. Imagine a future scenario where a family relies on robotic assistance in their daily lives. Describe how robots play crucial roles in various aspects, such as computer-assisted manufacturing for household appliances, military applications for security, medical assistance for family health, space exploration for scientific curiosity, and personal use for household chores and communication. Highlight specific examples of robots in each category and discuss their significance in enhancing the family's quality of life,
(CO1) [Comprehension]

7. Imagine you are a robotics engineer tasked with designing a robot for a warehouse environment where it needs to navigate, avoid obstacles, and transport items efficiently. Describe how you would implement the Subsumption architecture in your robot's design. Highlight specific scenarios within the warehouse, and explain how the layers of the Subsumption architecture contribute to the robot's behavior in each situation.

(CO2) [Comprehension]

8. Imagine you are designing an artificial neural network (ANN) to recognize handwritten digits for a digit recognition system. Create a neat diagram illustrating the architecture of the ANN for this specific task. Subsequently, explain the components of the architecture, including input layer, hidden layers, output layer, activation functions, and connections between neurons.

(CO3) [Comprehension]

9. Suppose you are a computer vision researcher working on a project that requires high accuracy in image classification, particularly for fine-grained recognition of objects in complex scenes. You decide to use a deep convolutional neural network, and you are considering GoogLeNet (InceptionNet) as a potential architecture. Explain how GoogLeNet works, highlighting its unique features, and provide a neat diagram illustrating its key components.

(CO4) [Comprehension]

10. Define Data Augmentation and explain its role in enhancing the diversity of a dataset during training and Provide examples of real-world applications where CNNs are utilized for real-time.

(CO3,CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS **2 X 20M = 40M**

11. i) Imagine you are a machine learning engineer working on developing a deep neural network for a complex pattern recognition task. During the training process, you encounter challenges in achieving convergence and improving the model's performance. Explain the concept of activation functions, their role in neural networks, and discuss five commonly used activation functions, highlighting their characteristics and applications.
ii) Provide a comprehensive list of various image recognition use cases, and for each use case, explain how image recognition technology can be applied to address specific challenges or improve existing processes.

(CO4,CO3) [Application]

12. i) A data scientist is working on a project involving image classification. The project has a limited labeled dataset, and training a deep learning model from scratch might be challenging due to resource constraints. Explain the concept of Transfer Learning and discuss its advantages in the context of this scenario.
ii) A computer vision project involves recognizing objects in high-resolution images with a focus on addressing the challenges of training very deep networks. Explain the architecture of ResNet and provide a neat diagram illustrating its key components, particularly emphasizing the concept of residual learning.

(CO3,CO4) [Application]